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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,250	01/15/2004	Douglas Melton Carper	121497 (07783-0172)	6395

31450 7590 12/28/2006

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EXAMINER	
MAYES, MELVIN C	
ART UNIT	**PAPER NUMBER**
1734	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/28/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/758,250	CARPER ET AL.	
	Examiner	Art Unit	
	Melvin Curtis Mayes	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/18/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

(1)

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(2)

Claims 12-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the Markush group in Claim 12, "silicon-silicon carbide composite" is claimed twice. This is not clear.

Claim Rejections - 35 USC § 103

(3)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(4)

Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as obvious over Steibel et al. 6,280,550 in view of JP 6-137103 and the admitted prior art.

Steibel et al. 6,280,550 discloses a method of making a composite turbine blade comprising: providing first reinforcement comprising an insert preform of silicon carbide fabric rigidized by deposited silicon carbide (silicon carbide-silicon carbide composite preform having

porosity); optionally depositing matrix material to fill only a portion of the porosity of the insert preform (silicon-silicon carbide composite preform having some porosity); providing second reinforcement comprising silicon carbide fabric plies (outer shell section preform); applying the silicon carbide fabric plies to contact the insert and define the surface shape of the blade; and depositing matrix material into the porosity of the first and second reinforcement, the depositing also providing bonding between the first and second reinforcements. Matrix material may be deposited by melt infiltration of silicon so that the matrix is silicon carbide or mixture of silicon and silicon carbide (col. 2-7). Steibel et al. do not disclose providing the composite turbine blade with a dovetail section by inserting an insert preform in the dovetail section.

JP 6-137103 teaches that a fiber reinforced composite turbine blade, such as of fiber strengthening ceramic (ceramic matrix composite), is made with a dovetail section using reinforcing fiber which extends from the dovetail section to the blade part (Abstract and computer translation).

The admitted prior art teaches that to manufacture thick dovetail sections of turbine engine components using ceramic matrix composites, preform inserts are used in the dovetail section to build up the thicknesses [0004].

It would have been obvious to one of ordinary skill in the art to have modified the method of Steibel et al. for making a composite turbine blade by making the turbine blade with a dovetail section, as taught by JP '103 as provided as part of a turbine blade and also made during the fabrication of a fiber reinforced composite blade. Providing the fabric plies (outer shell section preform) to extend from the blade part to a dovetail section to form both the blade and dovetail section of a turbine blade in one step of matrix deposition would have been obvious to

one of ordinary skill in the art, as JP '103 teaches that the reinforcing fiber for a turbine blade extends from the blade to the dovetail section.

Providing an insert preform in the dovetail section would have been obvious to one of ordinary skill in the art, as the admitted prior art teaches that preform inserts are used in the dovetail section to build up the thickness. Providing the insert preform in the dovetail section as silicon carbide fabric rigidized by deposited silicon carbide (silicon carbide-silicon carbide composite preform having porosity), or silicon-silicon carbide composite preform having some porosity, would have been obvious to one of ordinary skill in the art to provide the insert preform in the dovetail section similar to that provided in the blade section to allow for deposition of matrix by silicon melt infiltration, as disclosed by Steibel et al.

Further, by providing a second reinforcement of silicon carbide fabric plies for defining the surface shape of the blade and into which silicon can be deposited by met infiltration, an outer shell preform having at least some porosity is obviously provided.

(5)

Claims 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steibel et al. 6,280,550 in view of JP 6-137103, the admitted prior art and Steibel et al. 6,258,737.

Steibel et al. 6,280,550 discloses a method of making a composite turbine blade comprising: providing first reinforcement comprising an insert preform of silicon carbide fabric rigidized by deposited silicon carbide (silicon carbide-silicon carbide composite preform having porosity); optionally depositing matrix material to fill only a portion of the porosity of the insert preform (silicon-silicon carbide composite preform having some porosity); providing second reinforcement comprising silicon carbide fabric plies (preform); applying the silicon carbide

fabric plies to contact the insert preform and define the surface shape of the blade; and depositing matrix material into the porosity of the first and second reinforcement, the depositing also providing bonding between the first and second reinforcements. Matrix material may be deposited by melt infiltration of silicon so that the matrix is silicon carbide or mixture of silicon and silicon carbide. As shown in Figure 7, the insert is provided in the dovetail section of the blade (col. 2-7). Steibel et al. do not specifically disclose providing the second reinforcement as plies of silicon carbide prepreg cloth or disclose providing the composite turbine blade with a dovetail section by inserting a insert preform in the dovetail section.

JP 6-137103 teaches that a fiber reinforced composite turbine blade, such as of fiber strengthening ceramic (ceramic matrix composite), is made with a dovetail section using reinforcing fiber which extended from the dovetail section to the blade part (Abstract and computer translation).

The admitted prior art teaches that to manufacture thick dovetail sections of turbine engine components using ceramic matrix composites, preform inserts are used in the dovetail section to build up the thicknesses [0004].

Steibel et al. '737 teaches that in making a silicon carbide composite by melt infiltration with silicon, the silicon carbide fiber fabric is impregnated with high char yield slurry to form a prepreg before melt infiltration. The use of a high char yielding resin improves increases burn-out strength, produces a hard, tough preform and provides integrity to the preform structure during silicon melt infiltration. Steibel et al. further teach that before melt infiltration, the impregnated fabric (prepregged cloth) is either subjected to compression molding, bladder molding or autoclaving to form a preform for melt infiltration. Steibel et al. also teach that

carbon of micrometer particle size provided in silicon carbide preforms to give different composite properties of structure (col. 5, line 50 – col. 6, line 11, col. 6, line 64 – col. 7, line 12).

It would have been obvious to one of ordinary skill in the art to have modified the method of Steibel et al. for making a composite turbine blade by making the turbine blade with a dovetail section, as taught by JP '103 as provided as part of a turbine blade and also made during the fabrication of a fiber reinforced composite blade. Providing the fabric plies (outer shell section preform) to extend from the blade part to a dovetail section to form both the blade and dovetail section of a turbine blade in one step of matrix deposition would have been obvious to one of ordinary skill in the art, as JP '103 teaches that the reinforcing fiber for a turbine blade extends from the blade to the dovetail section.

Providing an insert preform in the dovetail section would have been obvious to one of ordinary skill in the art, as the admitted prior art teaches that preform inserts are used in the dovetail section to build up the thickness. Providing the insert preform in the dovetail section as silicon carbide fabric rigidized by deposited silicon carbide (silicon carbide-silicon carbide composite preform having porosity), or silicon-silicon carbide composite preform having some porosity, would have been obvious to one of ordinary skill in the art to provide the insert preform in the dovetail section similar to that provided in the blade section to allow for deposition of matrix by silicon melt infiltration, as disclosed by Steibel et al.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Steibel et al. for making a composite turbine blade by providing the second reinforcement as impregnated with high char yielding slurry (prepregged or a preform) before contacting the insert preform, as taught by Steibel et al. '737, as impregnated in silicon carbon

fiber fabric before silicon melt infiltration to increase burn-out strength, produce a hard, tough preform and provide integrity during silicon melt infiltration.

Autoclaving the assembly of second reinforcement prepreg and insert preform before silicon melt infiltration, as claimed in Claim 12, would have been obvious to one of ordinary skill in the art, as taught by Steibel et al. '737, to aid in forming the prepreg into preform shape before melt infiltration. It would have been obvious to have autoclaved to help shape the prepregged plies into the surface shape of the blade.

Providing the silicon-silicon carbide insert preform with carbon microspheres, as claimed in Claims 14 and 19, would have bee obvious to one of ordinary skill in the art, as taught by Steibel et al. '737, as added to silicon carbide preforms to give different composite properties of structure. The use of carbon microspheres in either of the insert preform or second reinforcement preform would have been obvious to one ordinary skill in the art depending on desired composites properties of the insert or the surface of the composite turbine blade.

Response to Arguments

(6)

Applicant's arguments with respect to claims 12-20 have been considered but are moot in view of the new ground(s) of rejection.

Forming a composite turbine blade with a dovetail section and using preform inserts in the dovetail section are known in the art, as set forth in the rejection. Steibel et al. '550 discloses that silicon carbide-silicon carbide composite preforms having porosity and silicon-silicon carbide composite preforms having some porosity are used as preform inserts to make ceramic

matrix composite turbine blades. Thus the use of these types of inserts in also the dovetail section would have been obvious to one of ordinary skill in the art.

Conclusion

(7)

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Maumus et al. disclose making composite turbine blades using an insert in the dovetail section.

(8)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
December 21, 2006